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(11) Publication number:

0 482 701 A1

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 91202680.4

(51) Int. Cl.⁵: B60C 25/05

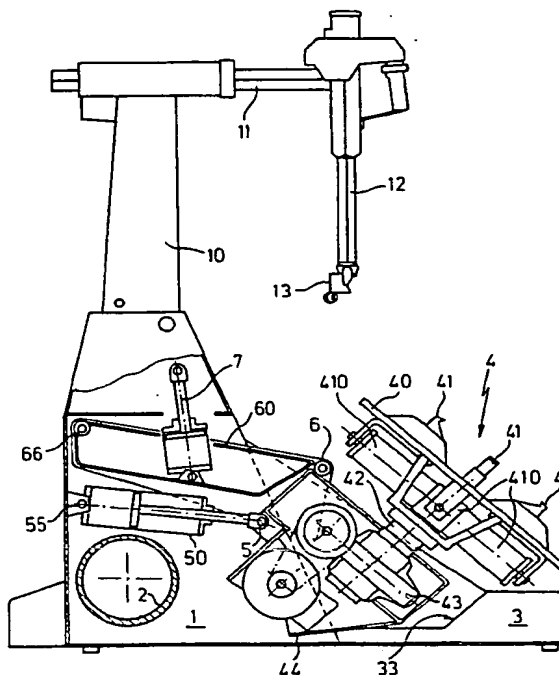
(22) Date of filing: 16.10.91

(30) Priority: 22.10.90 IT 4688390

(43) Date of publication of application:
29.04.92 Bulletin 92/18(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL SE(71) Applicant: CORGHI S.p.A.
Strada Statale 468, No.9
I-42015 Correggio Emilia (Reggio Emilia)(IT)(72) Inventor: Corghi, Remo
Galleria Carducci, 1
I-42015 Correggio (Reggio Emilia)(IT)(74) Representative: Corradini, Corrado et al
Studio Ing. C. CORRADINI & C. S.r.l. 4, Via
Dante Alighieri
I-42100 Reggio Emilia(IT)

(54) Tyre removing machine.

(57) A tyre-removal machine comprises a frame (1) with a self-centering unit (4) for locking the wheels in a horizontal position in front of an overlying tool head (13) for mounting/removing the respective tyres, the self-centering unit being connected to the frame (1) by way of a vertically lying articulated parallelogram having one side (55-66) formed by said frame, to the side (5-6) opposite the preceding there being hinged said self-centering unit in such a manner that this latter is able to occupy a lowered wheel loading/unloading position in which it is close to the floor and inclined to the side opposite the frame, and a raised working position, selectable at will, in which it arranges the wheel horizontal and within the radius of action of said tool head.

**FIG.1**

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This invention relates to a machine for removing/mounting tyres from and on respective wheel rims.

The invention is typically but not exclusively suitable for wheels which are relatively large and/or wide and hence relatively heavy.

For said tyre removal and mounting operations, tyre-removal machines are known to be used comprising generally a base frame, a rear column, a horizontal slide bar positioned at the top of said column, a vertical rod which slides relative to the front end of said bar, and a tool head for extracting/inserting the tyre beads from and into the respective wheel rims, said tool head being fixed to the lower end of said rod so that it lies above an underlying self-centering unit.

Said self-centering unit comprises in its turn a horizontal circular plate which is rotated by an underlying vertical shaft emerging from said frame and provided with a circumferential series of radially slidable equidistant jaws provided for locking the wheel rims in a horizontal position.

Said known self-centering units have however proved unsatisfactory.

A first reason is that the operator is required to raise the wheel from the floor in order to load it onto the self-centering unit, which is stationary in height, and vice versa. This is evidently fatiguing, particularly when handling relatively large and/or wide wheels, such as wheels for small trucks.

A second reason is that very often the operator is not in the optimum working position relative to the wheel locked on the self-centering unit, because the width of two different wheels can differ considerably. An example of this is the difference between a wheel of a small car and of a truck. Consequently the height at which the upper bead is located is bad both from the comfort and from the ergonomic aspect, leading to dangerous situations especially when the operator has to use a lever, such as when disengaging the bead from the rim.

The main object of the present invention is to obviate the aforesaid within the context of a simple and rational design.

Said object is attained by the self-centering unit according to the invention, wherein the base frame and the self-centering unit are connected together in such a manner that this latter occupies a horizontal raised working position in which the wheel is arranged facing the tool head, and a lowered rest position in which the self-centering unit is inclined towards the floor to allow the wheel to be unloaded/loaded from and onto the self-centering unit without the wheel having to be lifted.

In addition, said raised working position can be selected at will according to the width of the wheel being handled. All the objects of the invention are hence attained, as is apparent from the foregoing.

According to a first preferred embodiment, said raising movement is achieved by an articulated parallelogram system having two opposing sides consisting respectively of the machine frame and the casing of the self-centering unit.

In addition, according to said preferred embodiment, the swivel movement of the self-centering unit is achieved by a variable-length arm which forms one of the other sides of the parallelogram.

According to a further embodiment, the sides of the parallelogram are all of fixed length, the self-centering unit being hinged to that side of the parallelogram which is opposite the machine frame.

To swivel the self-centering unit a variable-length arm is provided, such as a cylinder-piston unit, which connects said self-centering unit to one of the adjacent sides of the parallelogram.

The characteristics and constructional principles of the invention will be apparent from the detailed description given hereinafter with reference to the accompanying figures, which illustrate a particular preferred embodiment thereof by way of non-limiting example.

Figure 1 is a partly sectional side elevation of the invention, the self-centering unit being shown in its lowered inclined position.

Figures 2 and 3 are two views similar to the preceding, showing the self-centering unit in two different raised working positions.

Firstly, for clarity and simplicity, and with reference to the introduction, it should be noted that said two different raised working positions relate for example to two wheels of different width.

As can be seen in the accompanying figures, the invention comprises a base frame 1 of portal formation for the reasons which will be apparent hereinafter.

The uprights of said portal are connected by the cylinder of a cylinder-piston unit 2 which controls a usual tool positioned on the outside of the frame for removing the tyre beads from the respective retention edges of the wheel rims, there being provided to the front of the portal base a platform 3. Between this latter and the frame 1 there is a recessed portion or compartment 33 which contains the lower part of a self-centering unit 4, which will be described hereinafter.

At the top of the frame 1 there is a column 10 which upperly supports a slidable horizontal bar 11 of prismatic shape.

The front end of the bar 11 supports a slidable vertical prismatic rod 12, to the bottom of which there is fixed a tool head 13, this latter being of known type in terms both of configuration and function.

Said self-centering unit 4 comprises a circular plate 40 provided with a circumferential series of radially movable equidistant jaws 41 of the double action type (in the sense that they grip the rims both from the outside and from the inside).

Said jaws 41 are operated by underlying double-acting pneumatic cylinder-piston units 410 arranged parallel to the direction of movement of the respective jaws 41, the plate 40 being rotated by a coaxial shaft 42 driven by a drive unit 43 of known type.

This latter is housed in an enclosing casing 44 which on the side facing the frame 1 comprises two overlying horizontal shafts 5 and 6 respectively, arranged parallel to the cross-member of said portal-shaped frame 1.

A double-acting pneumatic cylinder-piston unit 50 and a box member 60 are hinged respectively to said two shafts 5 and 6 and have their other ends hinged to the frame 1 at the points 55 and 66 respectively.

In this manner an articulated parallelogram is formed having one side defined by the frame 1 (articulation points 55, 66), whereas the lower side following the preceding is of variable length (cylinder-piston unit 50).

Finally, between the box member 60 and the overlying cross-member of the frame 1 there is a double-acting pneumatic cylinder-piston unit 7.

The purpose of the cylinder-piston unit 7 is to raise/lower the self-centering unit 4, which when the distance 5-55 is equal to the distance 6-66 moves parallel to itself (see Figures 2, 3), whereas the purpose of the cylinder-piston unit 50 is to cause said self-centering unit 4 to swivel about the shaft 6, as shown in Figure 1. When the self-centering unit 4 is in this latter position, a wheel can be very easily loaded by merely being rolled along the floor and, when positioned in front of the plate 40 of the self-centering unit 4, being allowed to rest laterally on this latter.

In this manner it can be gripped by the jaws 41 (which are retracted).

The unloading of the wheel is likewise simplified.

It should also be noted that the same results are obtained if the parallelogram sides defined by the pairs of axes 5, 55 and 5, 6 consist of two rigid (or fixed-length) connecting rods, if the self-centering unit is hinged to a connecting rod 5-6 and is connected to a cylinder-piston unit having its other end hinged to the connecting rod 5-55. This embodiment, which is simple to comprehend, is not illustrated in the figures.

The merits and advantages of the invention are apparent from the foregoing and from an examination of the accompanying figures.

The invention is not limited to the single embodiment illustrated and described, but comprises all technical equivalents of the aforesaid means and their combinations, if effected within the context of the following claims.

Claims

1. A tyre-removal machine, of the type comprising a frame (1) with a self-centering unit (4) for locking the wheels in a horizontal position in front of an overlying tool head (13) for removing/mounting the respective tyres, characterised in that between said frame and said self-centering unit there is interposed a device arranged both to cause said self-centering unit to move vertically, parallel to itself, between a raised position close to said tool head and a lowered position close to the floor, and to cause said self-centering unit to swivel between a horizontal position and a position inclined towards the floor.
2. A machine as claimed in claim 1, characterised in that said device comprises a vertically lying articulated parallelogram, opposing sides of which consist respectively of the machine frame and the casing of the self-centering unit, and which is operated by a cylinder-piston unit (7) connected to the frame.
3. A machine as claimed in the preceding claims, characterised in that the means for swivelling the self-centering unit consist of a variable-length arm (50) defining one of the sides of the parallelogram and connecting said two opposing sides together.
4. A machine as claimed in claim 3, characterised in that said variable-length arm (50) consists of a cylinder-piston unit.
5. A machine as claimed in claim 1, characterised in that said articulated parallelogram consists of four elements of fixed length, of which that opposite the frame carries the self-centering unit pivoted on an axis parallel to the points of articulation of the parallelogram.
6. A machine as claimed in claim 5, characterised in that the means for swivelling the self-centering unit consist of a variable-length arm, such as a cylinder-piston unit, which connects said self-centering unit to one of the adjacent sides of said parallelogram.

7. A machine as claimed in the preceding claims, characterised in that at least one of the parallelogram sides lying between said two sides which connect the self-centering unit to the frame consists of a box member of flat shape. 5

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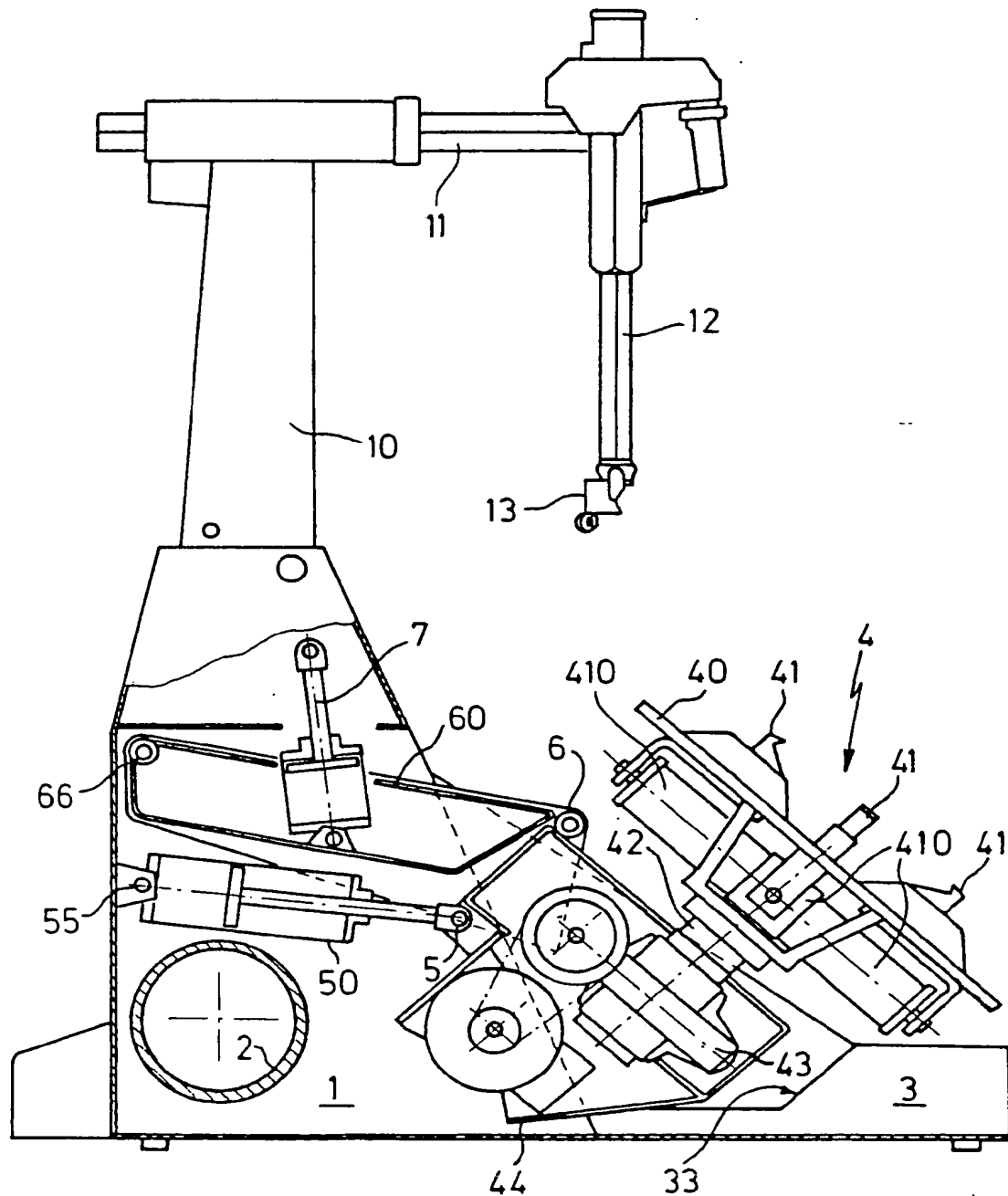


FIG.1

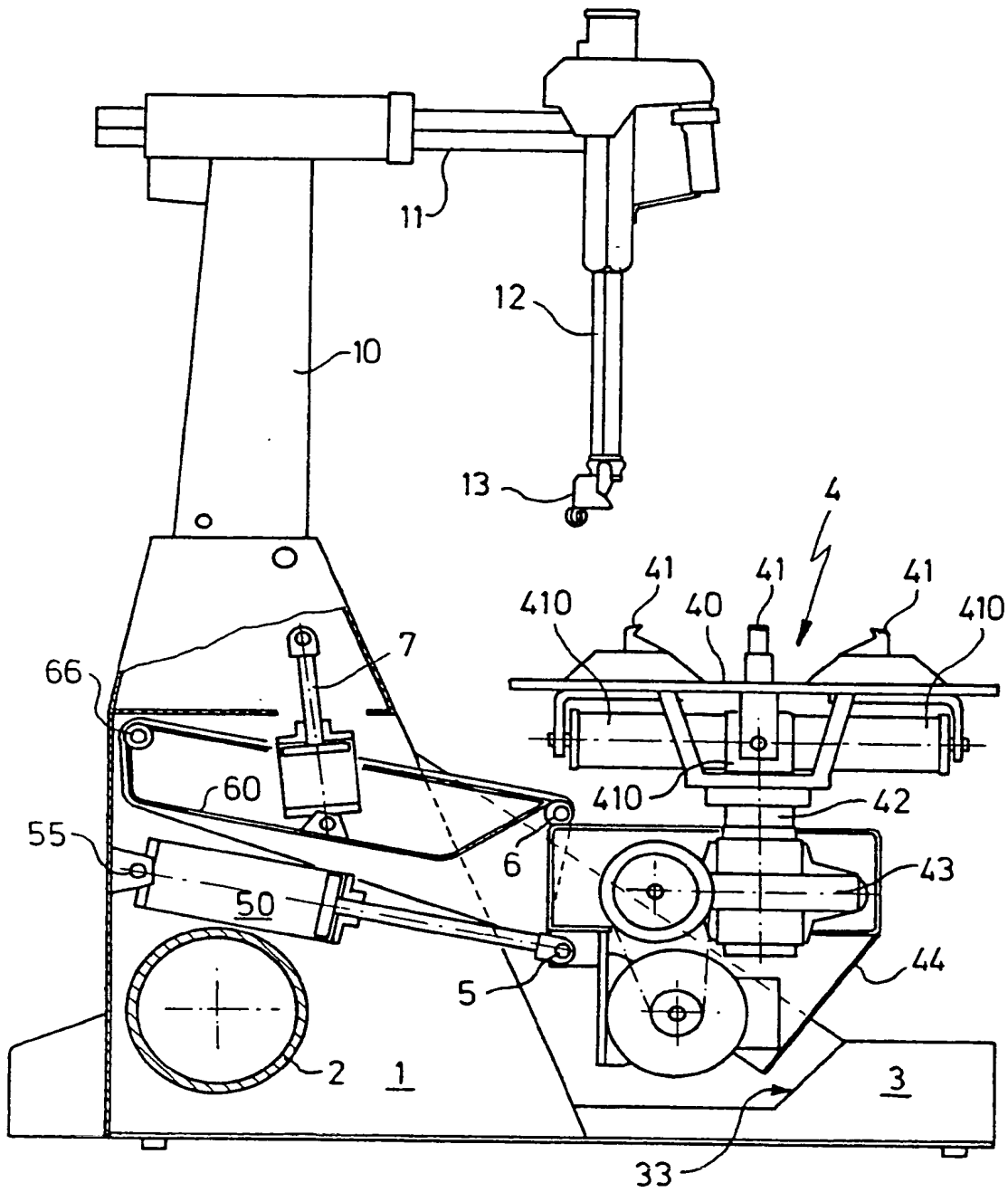


FIG. 2

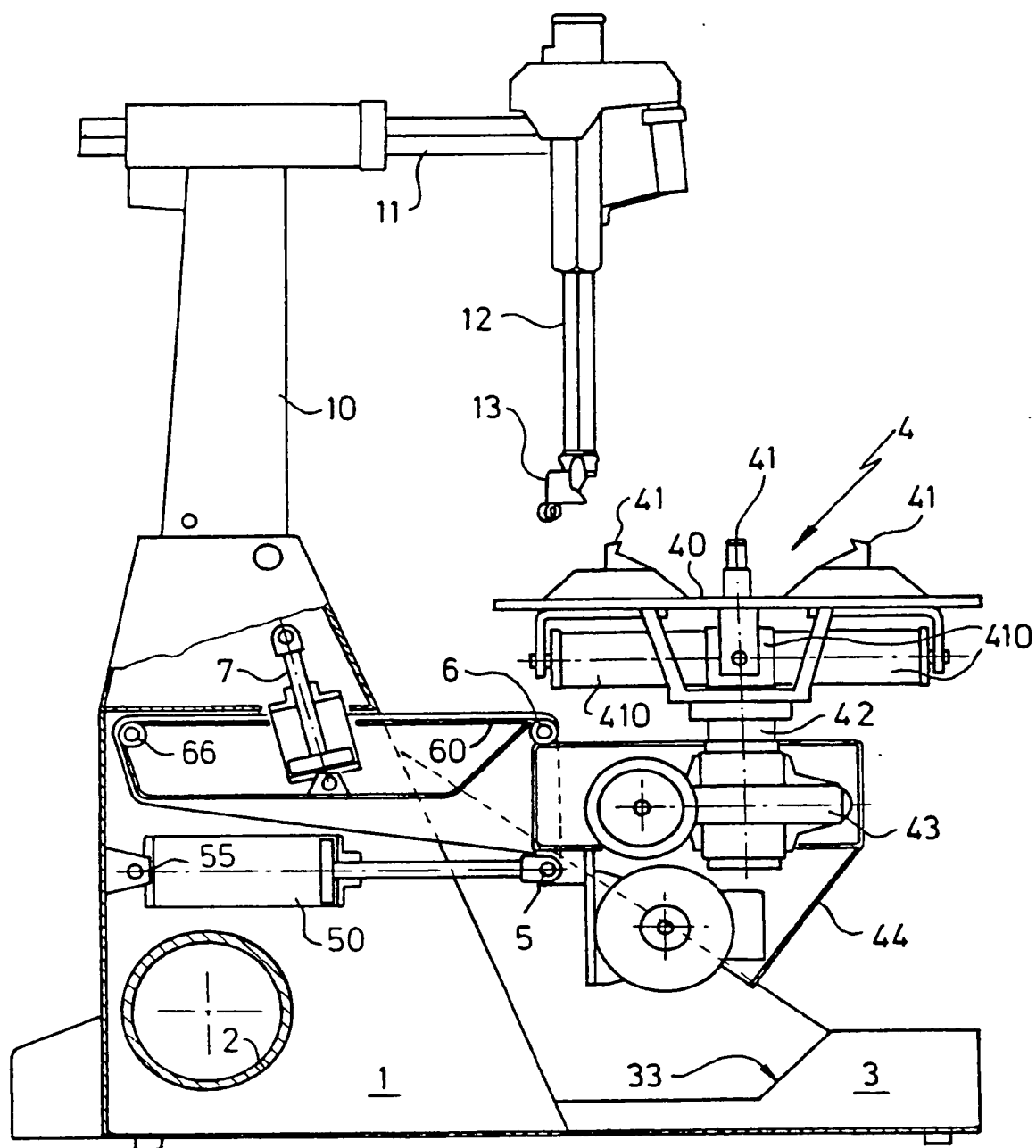


FIG. 3



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EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 91202680.4
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 5)
A	<u>US - A - 3 168 130</u> (TURPIN) * Fig. 3 *	1-4	B 60 C 25/05
A	<u>DE - A - 2 936 094</u> (HENNESSY) * Claims *	1-4	
A	<u>US - A - 4 039 016</u> (CUNNINGHAM) * Fig. 1 *	1-4	
A	<u>DE - A - 3 614 738</u> (WEILNHAMMER) * Abstract *	1	
A	<u>DE - A - 2 416 668</u> (CORGI) * Totality *	1	
A	<u>FR - A - 1 573 575</u> (CURIONI) * Totality *	1	TECHNICAL FIELDS SEARCHED (Int. Cl. 5)
			B 60 C B 60 S
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 29-11-1991	Examiner KREHAN
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			